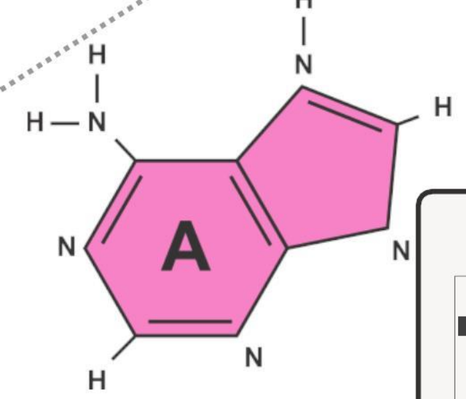
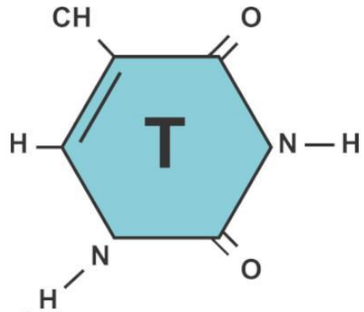


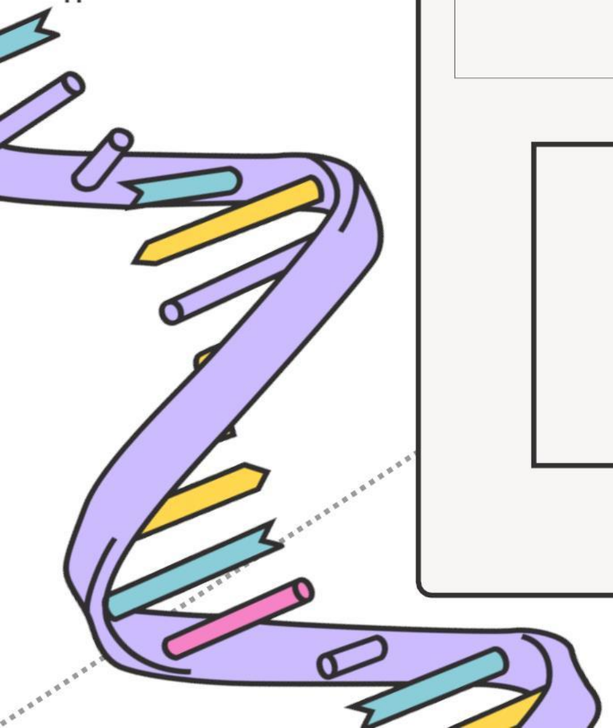
Libyan International Medical University

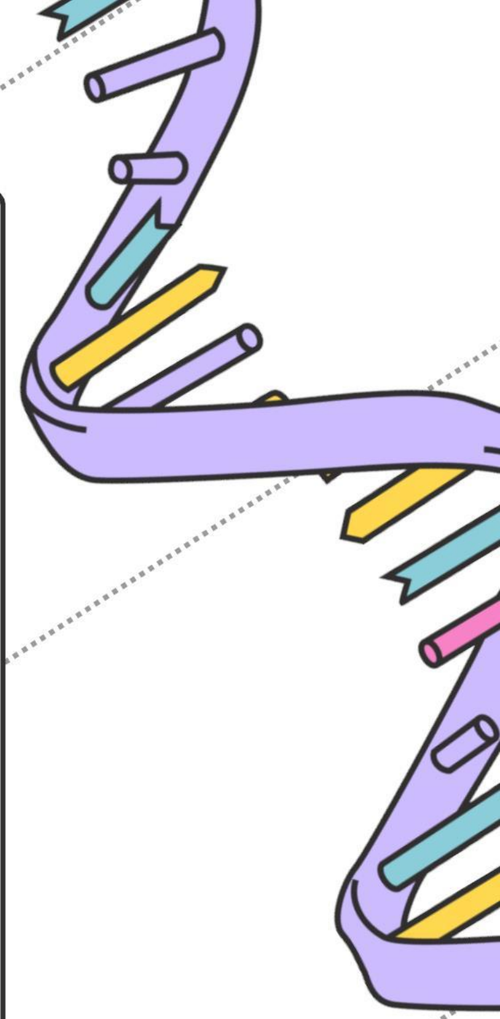
كلية الصيدلة
Faculty of Pharmacy

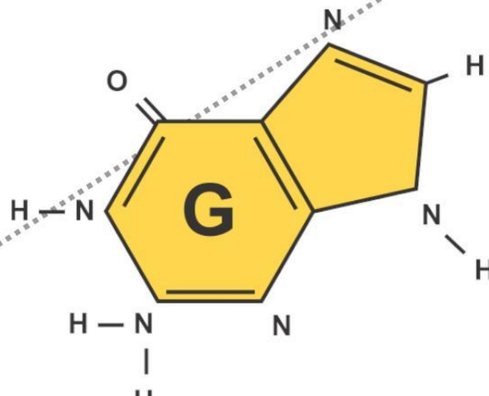
TRANSCRIPTOIN PROCESS

Aml Hanafi 4505
Aisha Yousef 4879
Amira Alazraq 4907
Zaineb fitory 5132





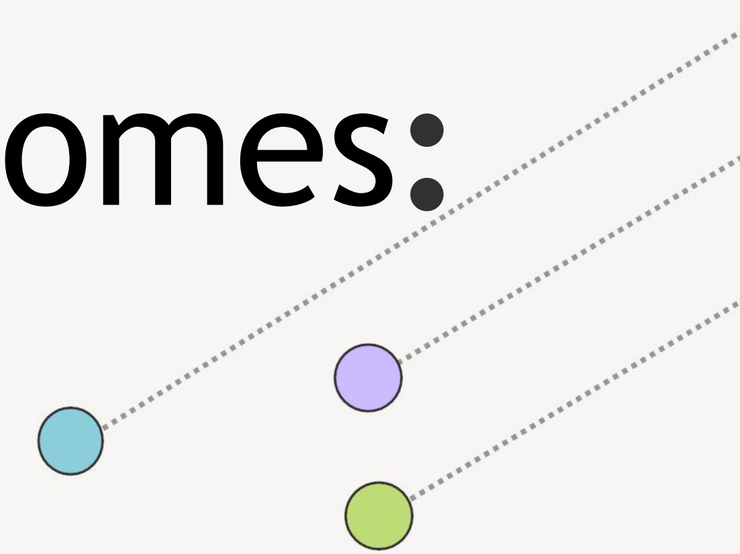




Intended learning outcomes:

Intended learning outcomes:

Define Transcription process.



Intended learning outcomes:

Define Transcription process.

Define RNA polymerase.

Intended learning outcomes:

Define Transcription process.

Define RNA polymerase.

Explain The Different stages of Transcription Process.

Intended learning outcomes:

Define Transcription process.

Define RNA polymerase.

Explain The Different stages of Transcription Process.

Differentiate Between Gene Transcription in Eukaryotic and Prokaryotic.

INTRODUCTION

Gene expression is the process by which information from a gene is used to create
a functional product, typically a protein.
It involves two main stages:
1.Transcription: The first step in gene expression where the genetic information stored in DNA is copied into messenger RNA (mRNA).
2.Translation: The second step, where the mRNA is used as a template to synthesize proteins, the functional molecules that perform most of the work within a cell.

INTRODUCTION

Cells can fine-tune transcription through various mechanisms, allowing them to respond to internal and external signals, such as **environmental changes**.

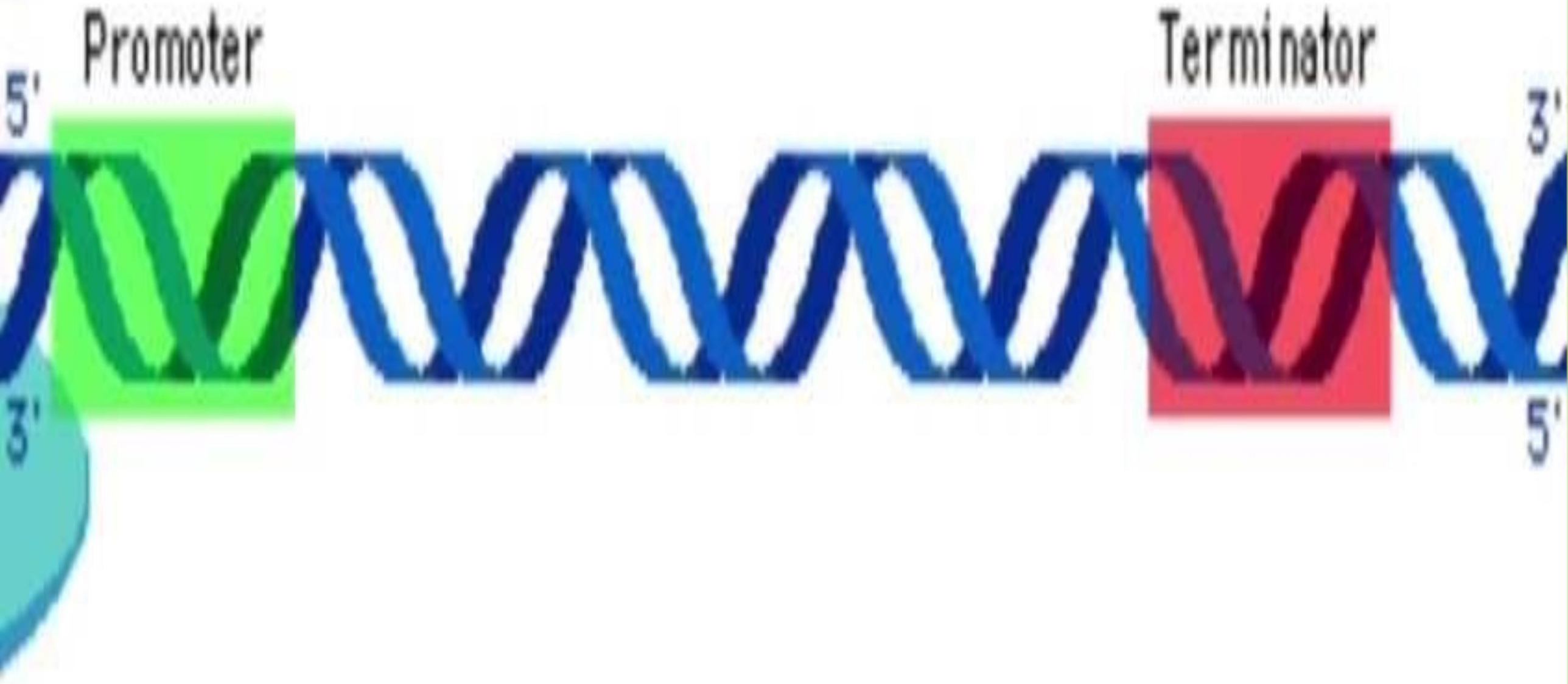
By controlling when and how much RNA is produced, **cells can ensure that proteins are synthesized only when required**, preventing waste and conserving energy.

What Gene Transcription Process?

What Gene Transcription Process ?

Transcription of genes is the first step in the process of gene expression.

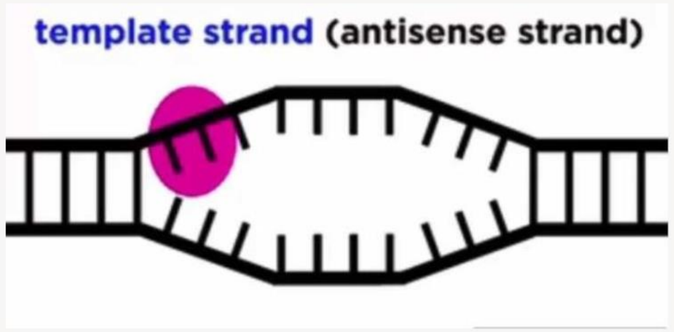
This process is essential for the **production of proteins**, as it serves as the bridge between the genetic code stored in DNA and the synthesis of proteins that perform various cellular functions.


Promoter
Terminator
5'
3'
3'
5'

The Transcription Consists Of Three key stages

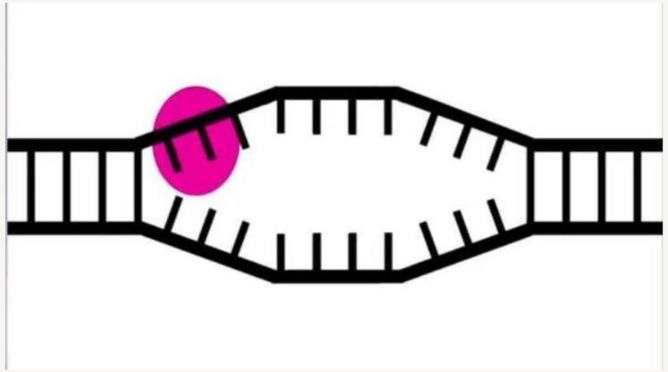
1

Initiation of a new RNA chain



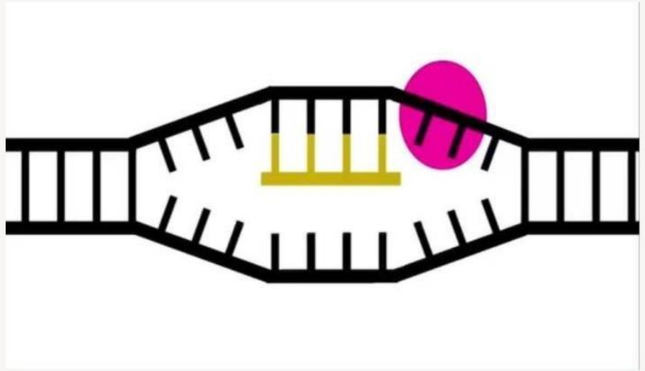
2

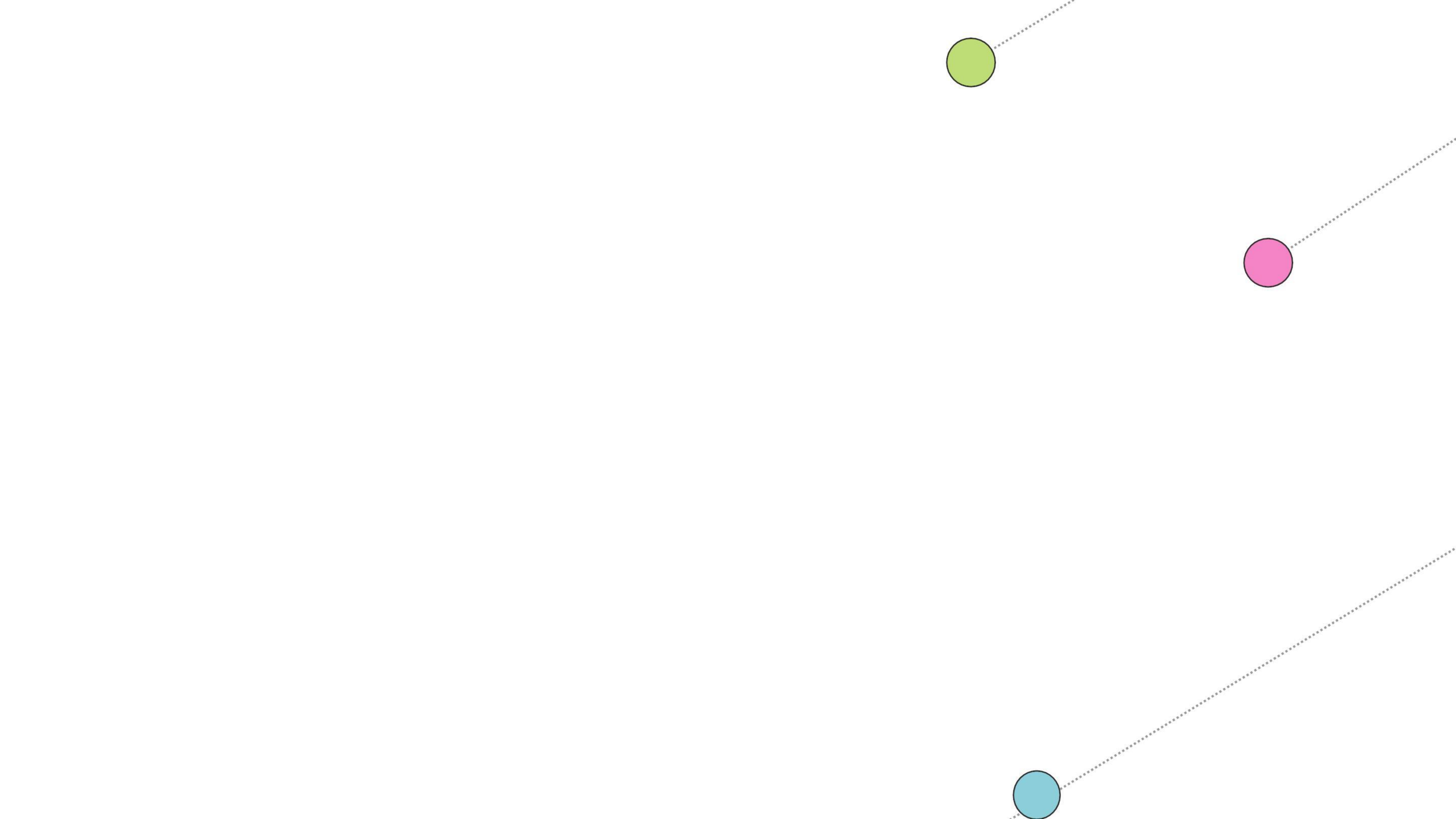
Elongation of the chain



3

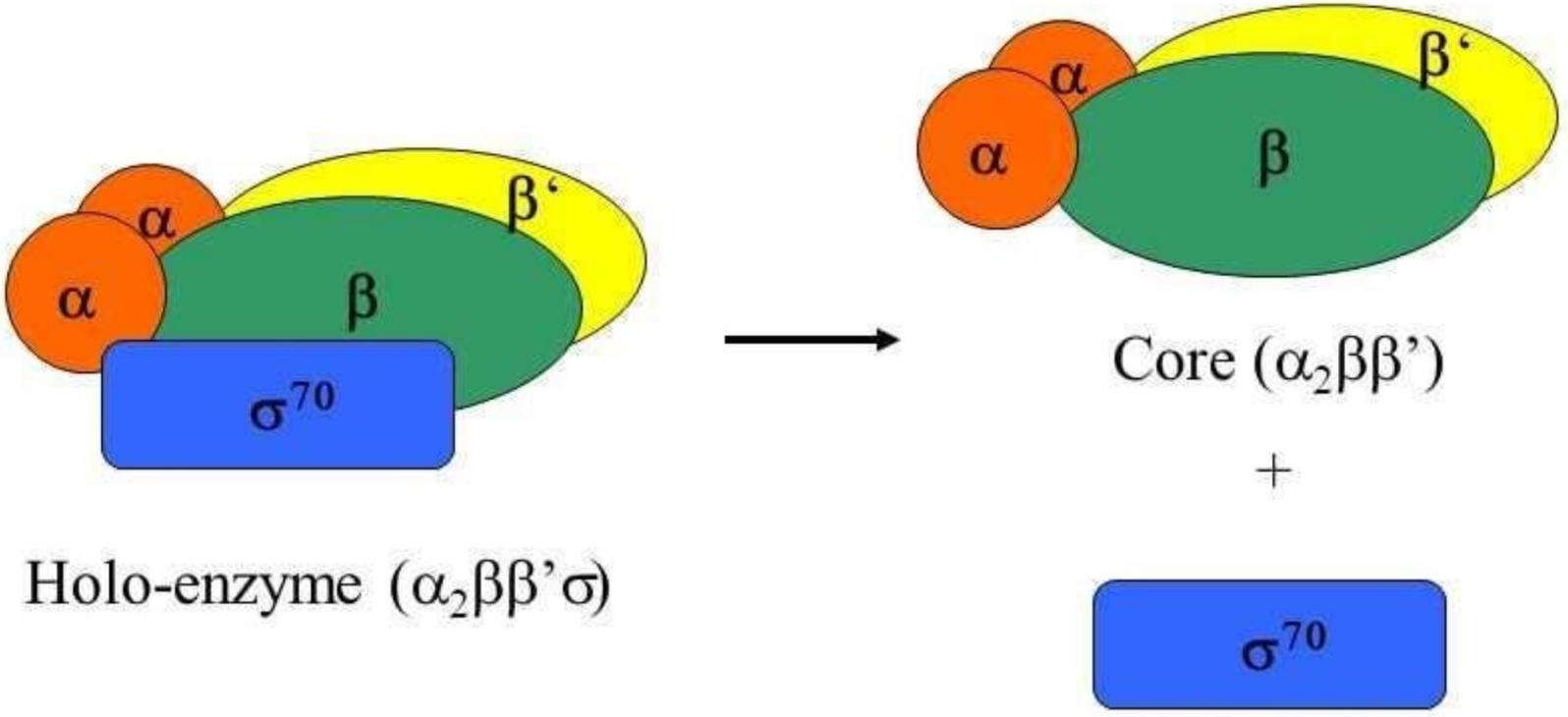
Termination of transcription

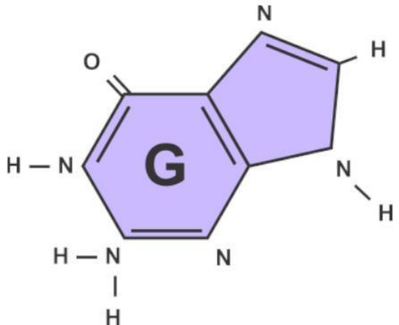


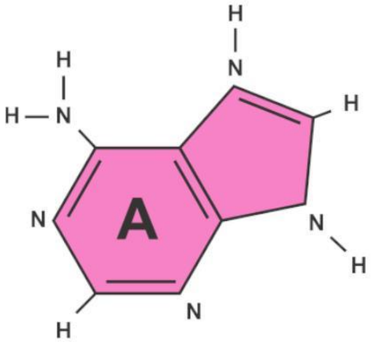


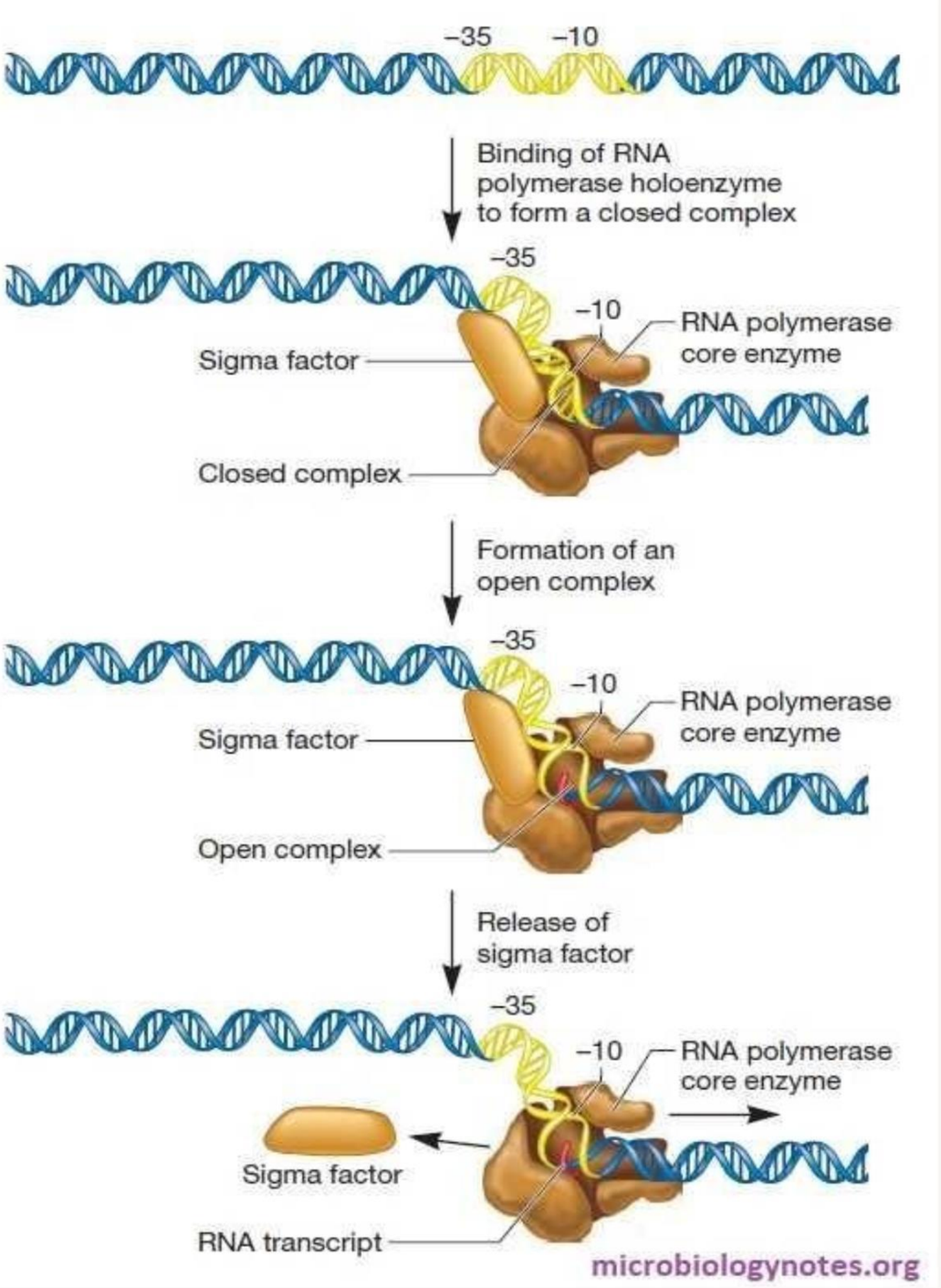
Structure of RNAPs :

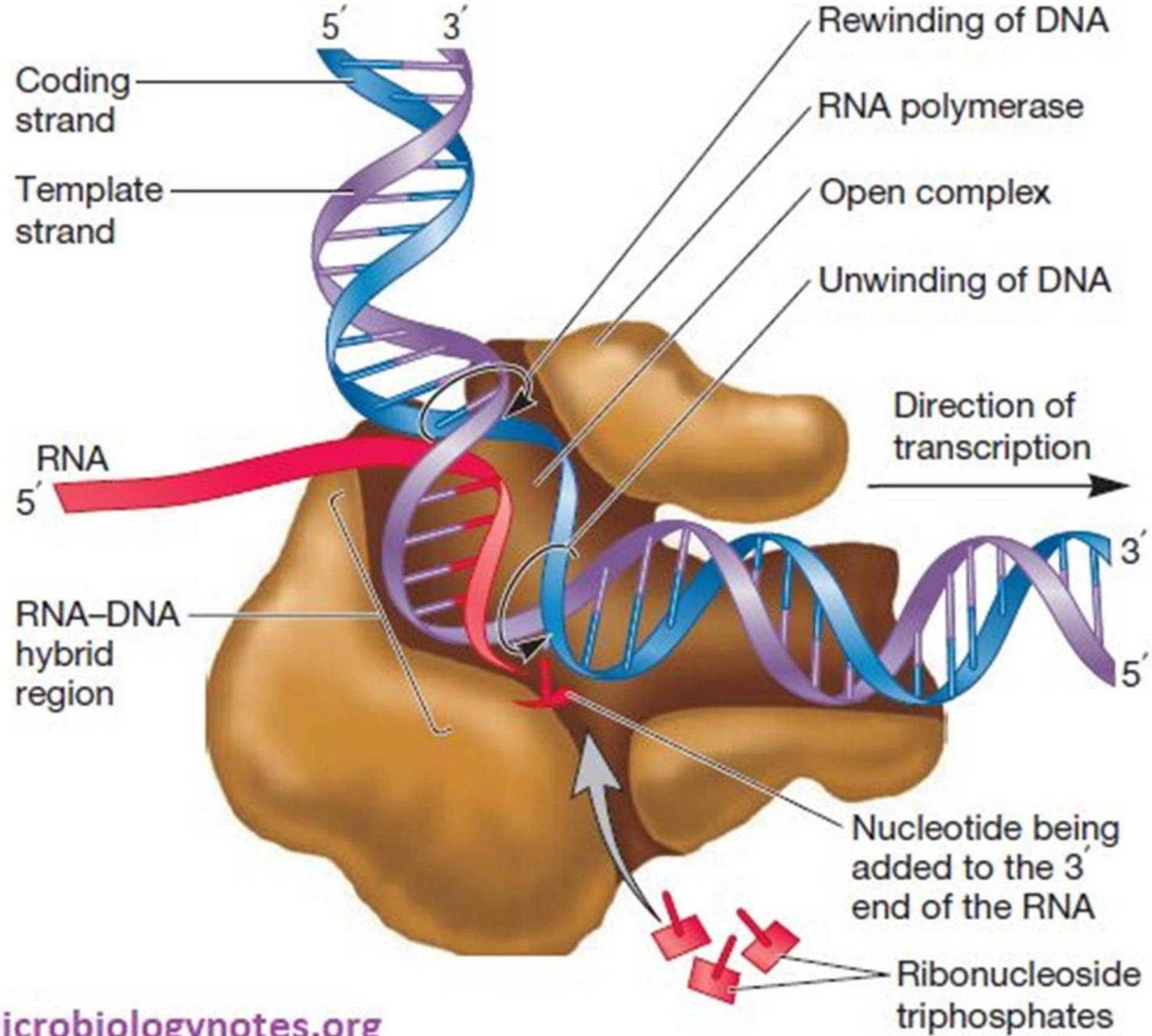
E. coli RNA polymerase

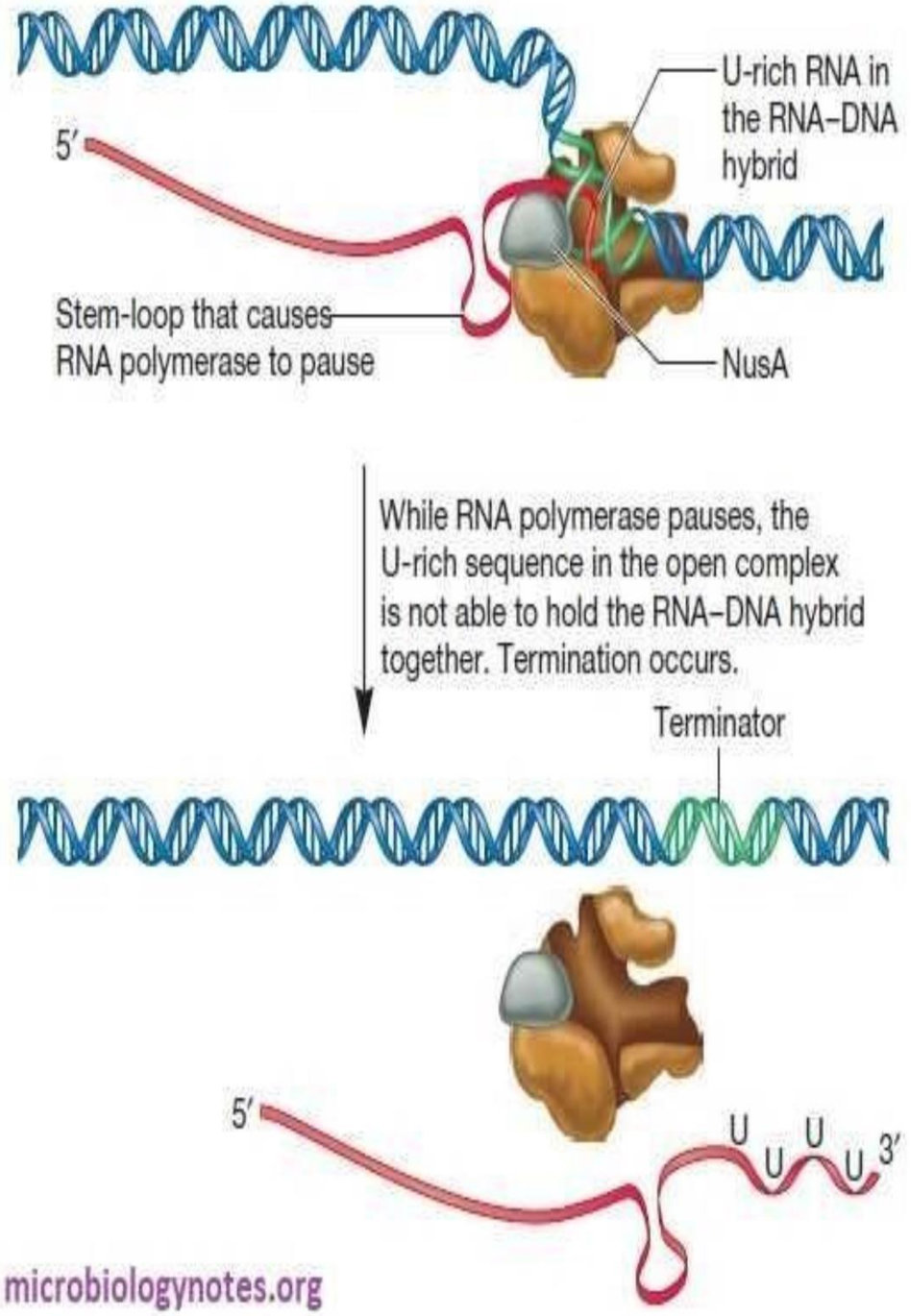


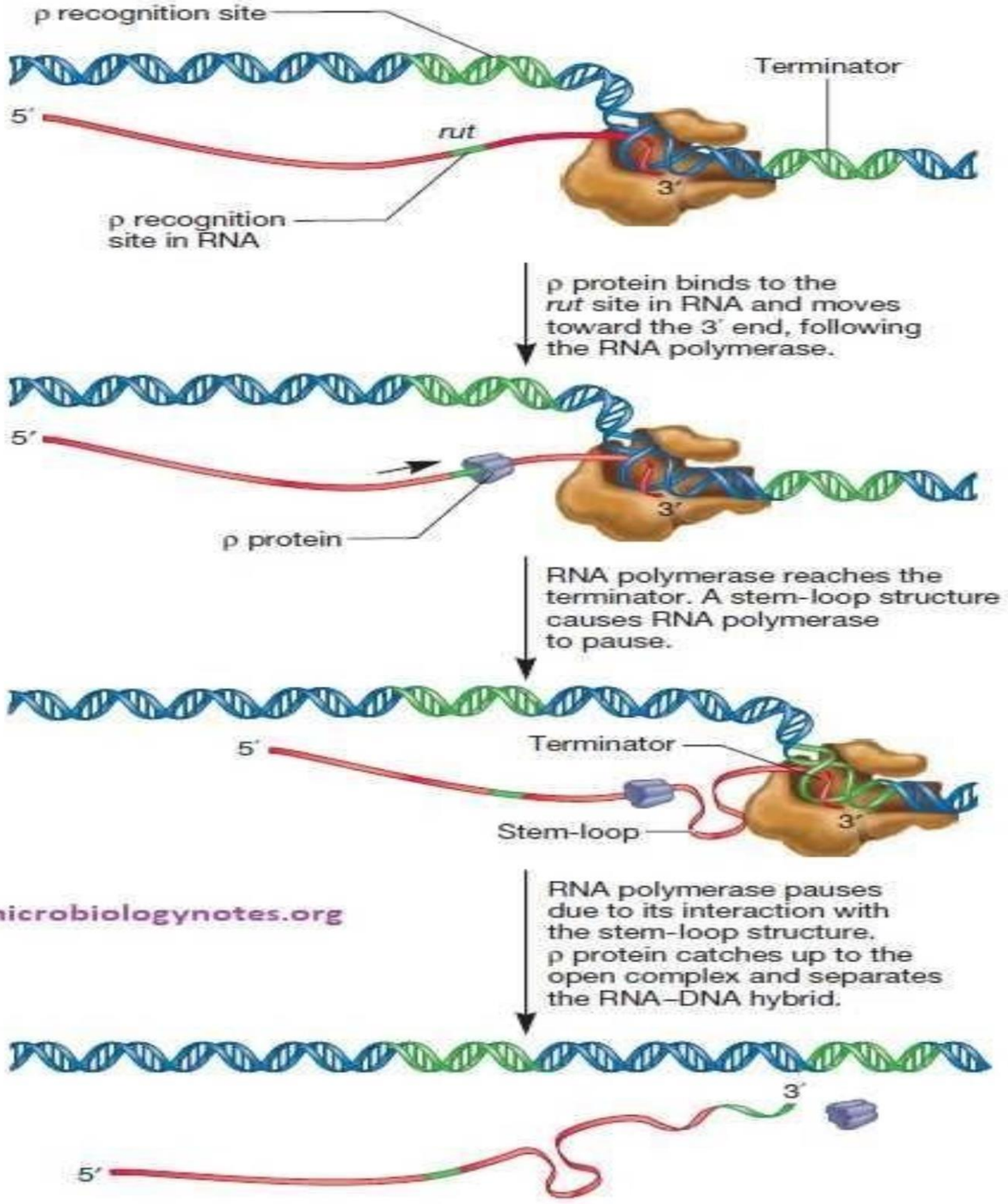

N
H
O
H — N
G
N
H — N
N
H

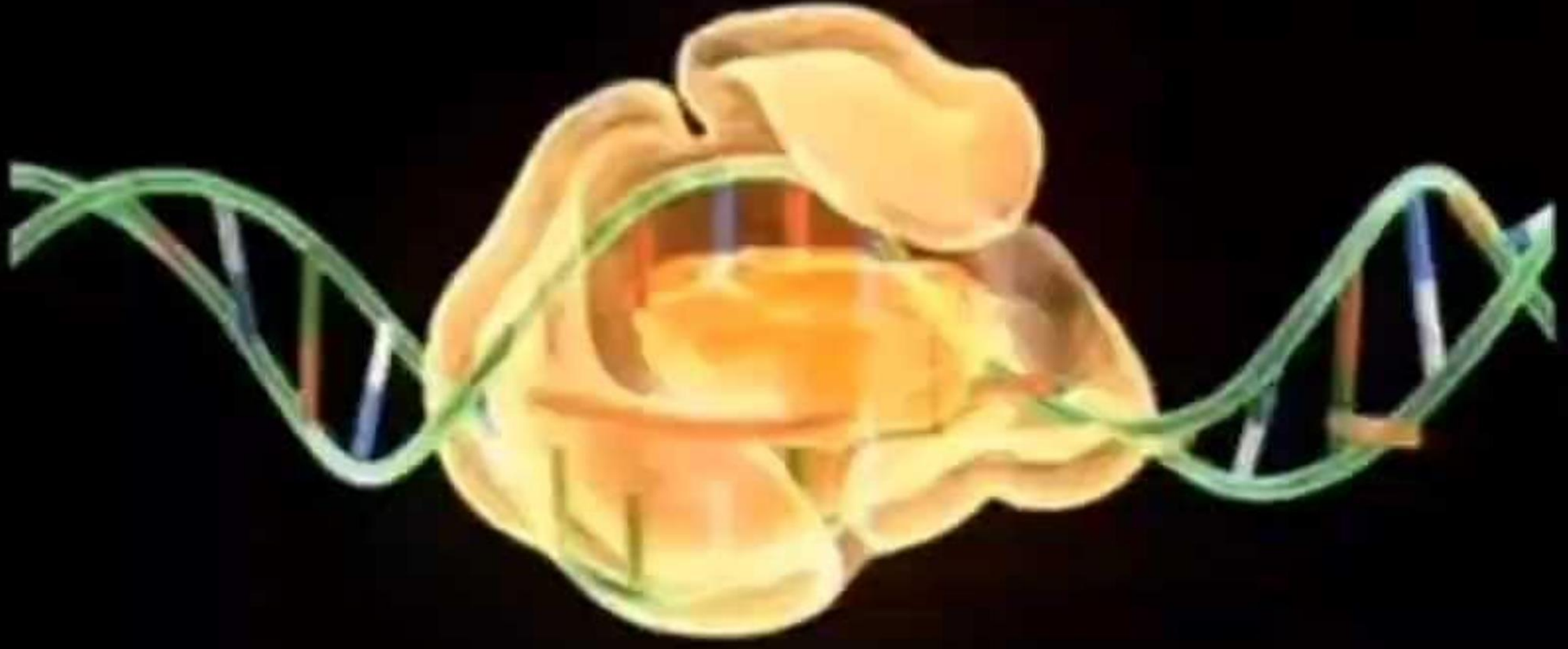

H
N
H
H — N
H
N
A
N
H
N
H


–35
–10
Binding of RNA polymerase holoenzyme to form a closed complex
–35
–10
RNA polymerase core enzyme
Sigma factor
Closed complex
Formation of an open complex
–35
–10
RNA polymerase core enzyme
Sigma factor
Open complex
Release of sigma factor
–35
–10
RNA polymerase core enzyme
Sigma factor
RNA transcript
microbiologynotes.org

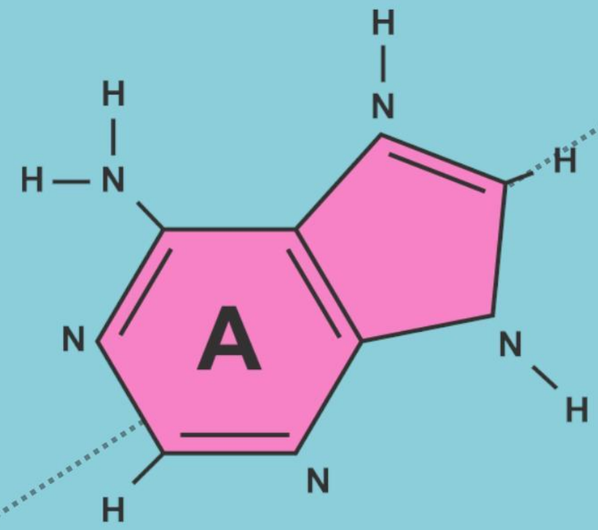

5′
3′
Coding strand
Template strand
Rewinding of DNA
RNA polymerase
Open complex
Unwinding of DNA
Direction of transcription
RNA
5′
3′
5′
RNA–DNA hybrid region
Nucleotide being added to the 3′ end of the RNA
Ribonucleoside triphosphates
microbiologynotes.org







How does gene transcription different between eukaryotic and prokaryotic cells in terms of location, enzymes involved, and transcription factor complexity?



Location: In eukaryotes, transcription takes place within the nucleus, separating it from the translation process that occurs in the cytoplasm

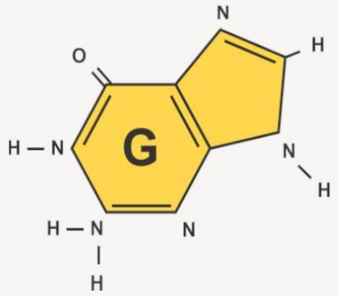
RNA Polymerase Types: Eukaryotic cells utilize three different RNA polymerases (RNA Polymerase I, II, and III). In contrast, prokaryotes rely on a single RNA polymerase for the synthesis of all RNA types, simplifying the process

InitiationComplexity: Initiating transcription in eukaryotes is complex and requires several transcription factors to assemble at the promoter site before RNA polymerase can begin polymerase, allowing it to recognize promoter sequences

Promoterstructure: Eukaryotic promoters are complex and consist of core and regulatory elements, such as the TATA box
aresimpler,withrecognizable consensus sequences at the -10 and -35

mRNA Processing: After transcription, eukaryotic pre-mRNA undergoes extensive processing, including capping, splicing (removal of introns), and polyadenylation to produce mature mRNA. Prokaryotic mRNA does not require processing; transcription directly produces mature mRNA that is ready for translation

Coupling with Translation: In eukaryotes, transcription and translation are spatially and temporally separated; transcription occurs in the nucleus, and translation takes place in the cytoplasm. In prokaryotes, transcription and translation are coupled, occurring simultaneously in the cytoplasm



Rate of Transcription: Transcription in eukaryotes is generally slower and more regulated due to the complexity of promoter structures and the need for mRNA processing. In prokaryotes, transcription is faster, as it is a simpler process with fewer regulatory steps and no requirement for mRNA processing.

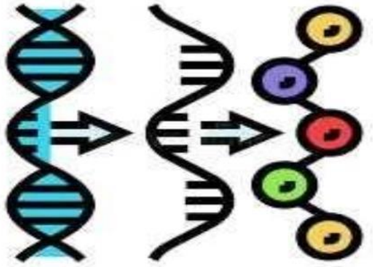
Questions

1- where does transcription occur in eukaryotic & prokaryotic ?

2- what are the three main stages of transcription ?

Summary

1-Gene transcription is the process by which genetic information from DNA is copied into RNA by the enzyme RNA polymerase.
2- In prokaryotic cells, there is a single RNA polymerase that transcribes all types of RNA, and transcription occurs in the cytoplasm, often occurring simultaneously with translation.
3-eukaryotic cells have three types of RNA polymerase, each specialized in transcribing a specific type of RNA.
4- Transcription takes place in the nucleus, and the resulting mRNA undergoes processing before being transported to the cytoplasm.
5-The key difference lies in the presence of multiple RNA polymerases in eukaryotes and the more complex transcription and processing mechanisms compared to prokaryotes



References:

1. Russell,P.J.(2010).iGenetic, Benjamin cummings.
2. Molecular Biology of the Cell by Bruce Alberts (6th Edition)
3. Relevant Chapter: Chapter 7 - "RNA and the Gene: Transcription and Translation"

Thank you for listing